

Department of Transfusion Medicine

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General Summary

1. Transfusion-related acute lung injury

Transfusion-related acute lung injury (TRALI) is characterized by the sudden onset of respiratory distress following blood transfusion and is considered one of the most serious complications of blood transfusion. On the other hand, similar adverse symptoms are sometimes observed in cardiac pulmonary edema due to massive or rapid transfusion of blood products, and this response is known as transfusion-associated circulatory overload (TACO). Although TRALI and TACO are both important problems of transfusion medicine, their risks are not fully recognized among physicians, and distinguishing the 2 conditions is occasionally difficult. With this background, a new study group (T. Tasaki, principal investigator) was formed by the Health and Labour Science Research Grants to establish guidelines that could help distinguish TRALI from TACO and guide subsequent treatment.

2. The risk of bacterial contamination in blood derived from volunteer donors having loose bowels

In Japan, the main reason for the reduction in the shelf life of red cell components from 6 weeks to 3 weeks was the risk of contamination by bacteria, such as *Yersinia enterocolitica*, that can grow at low temperatures (4°C). On the other hand, the demand for blood usage in Japan has gradually increased because of the aging population and the low birth rate. Therefore, the possibility of prolonging the storage period has been investigated from the points of view of the risk of bacterial contamination and the cost benefits. This study was supported by Grants-in Aid for Scientific Research.

3. Pediatric transfusion

There remain unresolved problems in pediatric transfusions. Hemolysis due to blood transfusion with long, narrow tubes is a concern for very low birth weight infants. Recently, a new transfusion device with a peristaltic roller system that moves blood through the tube without damaging blood cells has been introduced for such cases. We investigated the advantages of the new device for preventing hemolysis.

4. A case with anti-Kp^c antibodies

Research Activities

1. In the first year of research on TRALI and TACO, the following topics were investigated: 1) recent transfusion-related adverse events around the world related to TRALI and TACO, 2) the relationship between anti-leukocyte antibodies in the donor blood and dyspnea in recipients, 3) trends in perioperative transfusion of blood components including albumin, and 4) experimental massive transfusion using animal models. In nearly 30% of patients suspected of having TRALI, dyspnea appeared to be due to

TACO. Recently, an average of 2 patients die of TRALI each year in Japan. In more than 95% of cases with an intraoperative blood loss of more than 1,000 mL, albumin was used. However, albumin was used in about 60% of cases with less blood loss. Studies of adverse events due to donors' anti-leukocyte antibodies and studies to establish animal models of TACO are now underway.

2. In the hundreds of blood specimens, including those from donors having loose bowels, blood cultures did not show bacterial contamination. The results suggest that the risk of bacterial contamination is extremely low. In our hospital, the main reason (> 40% of cases) for the disposal of packed red cells was that the product had exceeded its shelf life. These facts support the extension of the storage period from 3 weeks to 6 weeks. However, the new data would likely support the longer storage period in Japan only during a serious shortage of blood, due, for example, to a pandemic or earthquake.

3. Contrary to our expectation, the rate of hemolysis with the new device was slightly greater than that with the currently used syringe infusion pump, although the difference was small. Transfusion of newer blood using a potassium-reduction filter would be preferable for very low birth weight infants. This result was reported at the 60th meeting of the Japan Society of Transfusion Medicine and Cell Therapy.

4. We reported an extremely rare case of alloantibodies (anti-Kp^c) against very low incidence (<0.01%) red blood cell antigens. The patient received 2 units of incompatible blood and developed shock due to a delayed hemolytic transfusion reaction but recovered within 10 days without prolonged hemolytic complications. This case was reported at the 60th meeting of the Japan Society of Transfusion Medicine and Cell Therapy.

Publications

Tasaki T, Miura Y¹, Yamada Y¹, Kato Y, Hoshi Y (Iwate Med Univ). The hematological and clinical effects of X-ray contrast medium contaminat-

ing autologous blood for transfusion purposes. *Transfus Apher Sci.* 2012; **47**: 139-43.